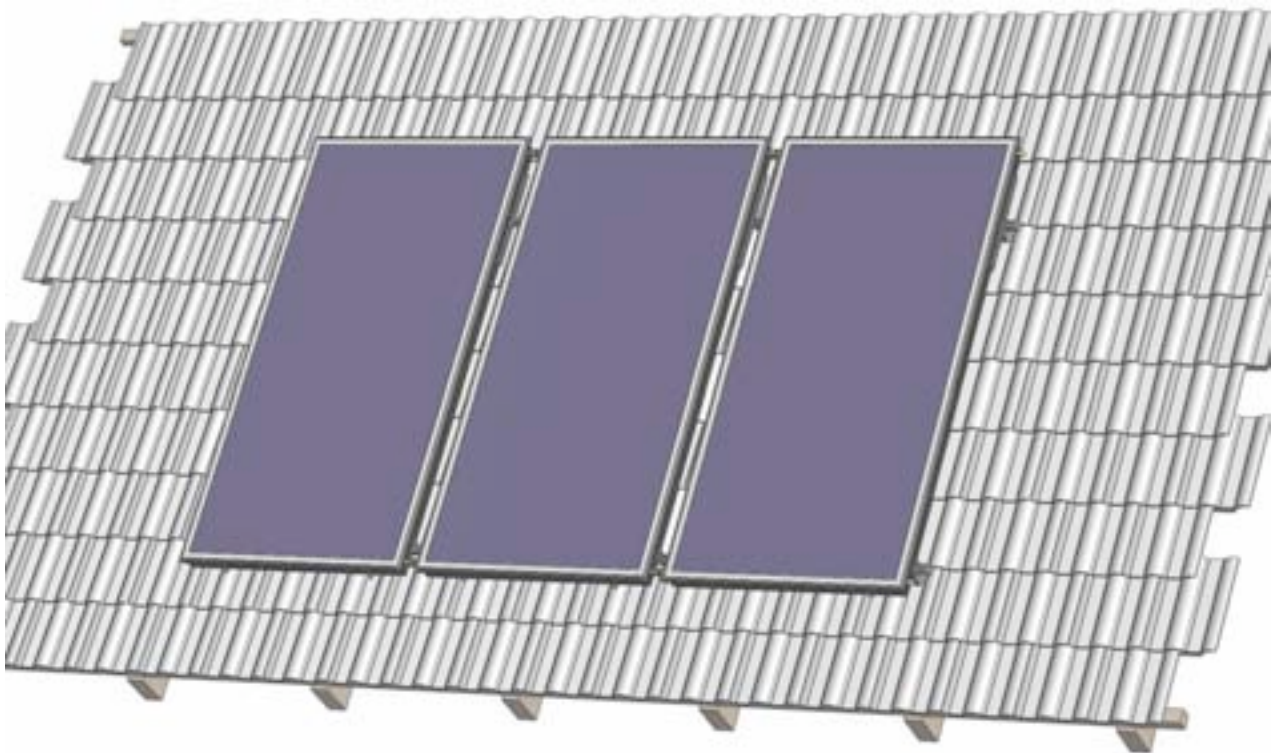


Installation & Operating Instructions for Flat Plate Solar Collectors on inclined tiled roofs:

- Harp, Copper Absorber
- Harp, Aluminium Absorber



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1. General information

1.1. ES Solar Collector

ES -2.0 solar Collectors are **intended** to heat water for domestic properties and public utility buildings. The ES-2.0 Collectors can also be **used** to support central heating systems and heat water for swimming pools.

1.2. Types of Solar Collectors

- ES-2.0 - Harp Solar Collector, copper absorber, surface area 2 m²
- ES.A-2.0 - Harp Solar Collector, aluminium absorber, surface area 2 m²
- ES-2.0 - Harp double Solar Collector, copper absorber, surface area 2 m²
- ES.A-2.0 - Harp double Solar Collector, **aluminium** absorber, surface area 2 m²

- ES-2.3 - Harp Solar Collector, copper absorber, surface area 2,3 m²
- ES.A-2.3 - Harp Solar Collector, **aluminium** absorber, surface area 2,3 m²

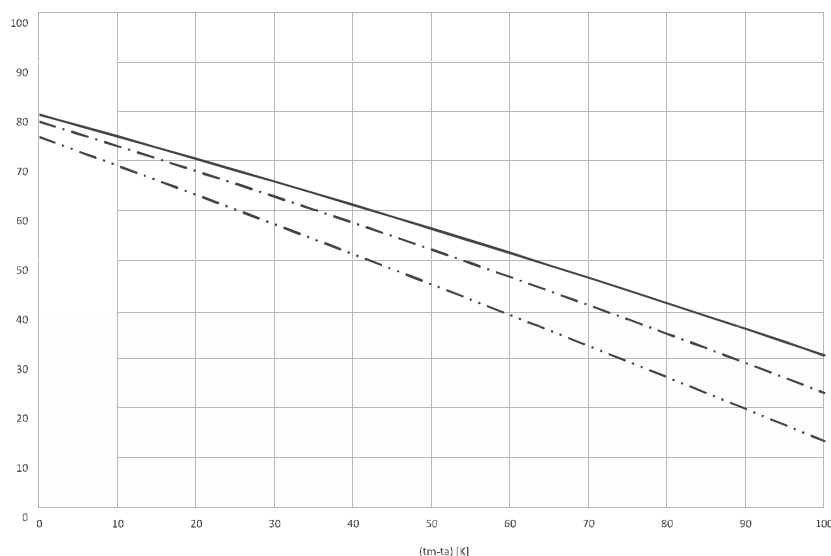
1.3. Technical data table

Flat Plate Solar Collector		ES-2.0	ES.A-2.0	ES-2.3	ES.A-2.3
Width	mm	1072			
Height	mm	2119		2424	
Depth	mm	90			
Weight	kg	36,5		41,8	
Absorber		copper	aluminium	copper	aluminium
Collector surface area	m ₂	2,27		2,6	
Absorber surface area	m ₂	2,0		2,3	
Active surface area of absorber	m ₂	1,98		2,28	
Optical efficiency η_1	%	81,5	80,1		77,0
Heat loss coefficient η_1	W/m ₂ K	3,49	3,89		4,62
Heat loss coefficient η_1	W/m ₂ K ₂	0,004	0,005		0,003
Connections: Cu pipe	mm	18			
Liquid content	litre	1,13		1,4	
Max. working pressure	bar	6,0			
Flow: min — max.	l/min	1 - 4			

¹ Following parameters: active surface area of absorber (for G=800 W/m²) - on base of research carried out at Institute for Fuel and Renewable Energy in Warsaw

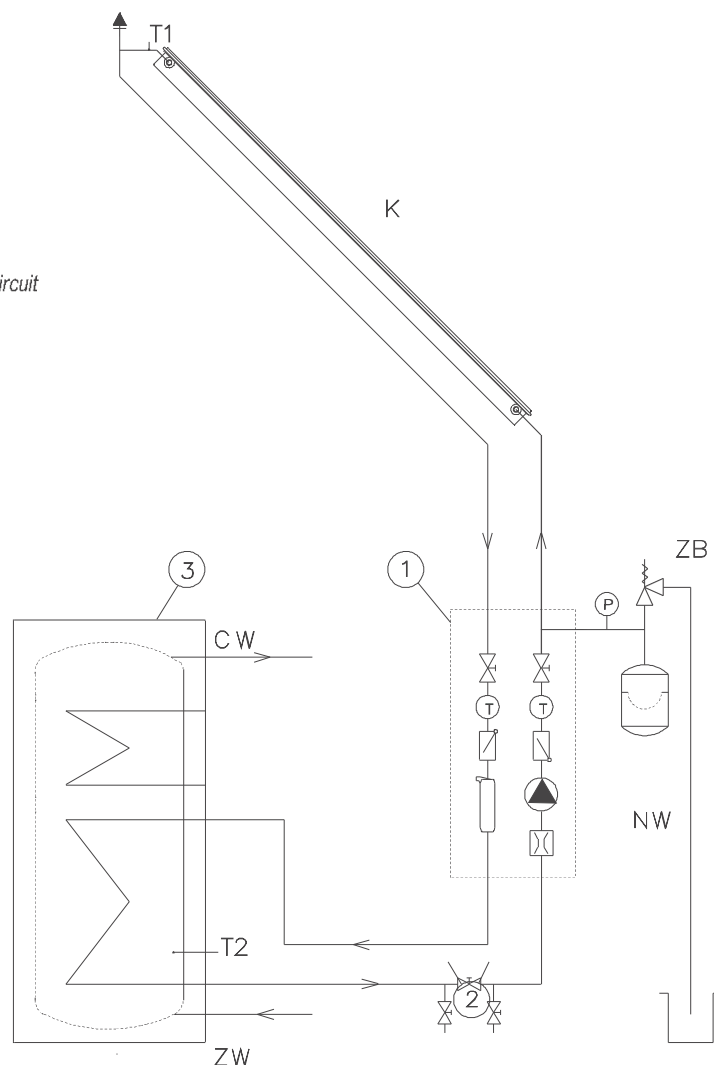
1.4. Efficiency graph

Solar Collectors efficiency graph is related to the active surface area of absorber (for G=800 W/m²)



1.5. Domestic hot water heating installation diagram

1 - Solar pump group
 2 - Valves for filling, emptying and flushing of Solar circuit
 3 - Hot water tank
 Ti - Collector temperature sensor
 Tt - Tank temperature sensor
 K - Solar Collector
 NW - Expansion vessel
 ZB - Safety valve
 ZW - Cold water inlet
 CW - Hot water outlet



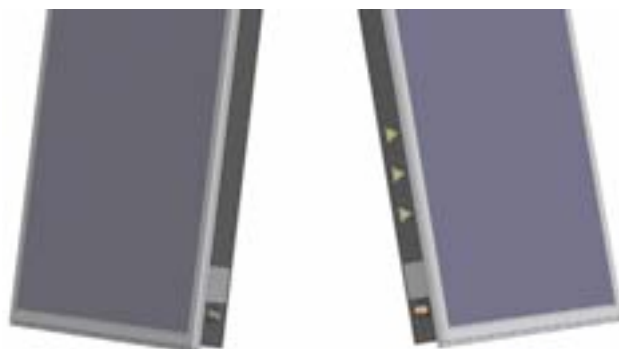
Solar installation must be in compliance with the **BS EN 12975/12976 norm.**

1.6. Identification labels

An identification label is placed on the **both** sides of the Collector (at the bottom). Additionally, the warning and information icons are placed on the left side of Collector.



User - Be **aware**.



The user is obligated to replace the identification labels where these are unable to be read.

2. Safety Instructions

2.1 General



Please carefully read and understand these instructions before installing the EHC Thermal Solar System in order to ensure: a safe, risk free installation and trouble free operation. Following installation and commissioning of the system the operation of the system and associated controls should be explained to the customer and these instructions left with them for future reference.

EHC Thermal Solar System must be installed in accordance with the manufacturer's instructions and all relevant regulations in force at the time of installation. The EHC Thermal Solar System is subject to Building Regulation G3 (England and Wales), Technical Standard P3 (Scotland) or Building Regulation P5 (Northern Ireland). Installation and must be carried out by a competent person.

2.2 Working at Height

It is mandatory that the Working at Height Regulations (WAHR) is adhered to at all times. A site Risk Assessment must be conducted before operations take place such that suitable precautions are put in place to eliminate or at the very least minimize risks of injury; not only to installers but to also protect the general public.

2.3 Lightning Protection



If the Solar Collector System is installed over a height of 20 M and the building is without a lightning protection system then couple the electrically conductive elements to the earth (min earth section – 16mm) and the equipotent bonding elements of the installation.

If the Solar Collection System does not exceed a height of 20 meters then a lightning protection system is not necessary. Where a building is equipped with a lightning protection system then we strongly recommend that suitably qualified and competent lightning equipment installer is used to connect the EHC Solar Installation to the existing lightning protection system.

2.4 Installers

It is strongly recommended that MCS Certified Installers are used in the installation or servicing of EHC Thermal Solar Systems

2.5 Mounting Kits



It is mandatory that only EHC Solar Collector Mounting Kits are used to support the EHC Solar Collectors and failure to carry this out may increase the risk of personal injury and/or damage to the property

2.6 Risk of burn injury



The solar Collectors and assembly elements may be hot **due to** radiation and therefore there is a risk of a burn injury. As a result the guidelines below should be followed in order to avoid burn injuries:

- use personal clothing (e.g. Overalls, gloves, etc)
- put a canvas cover on the Collector housing
- wait for temperature to go down before starting work on the unit

2.7. Transportation, storage and handling

- Transport the Collectors in original manufacturer's package & according to package marking.
- Carefully handle and do not overturn or stack unpacked Collectors
- Packed Collectors must be **handled** by forklifts or pallet jack
- Protect against inclement weather **conditions** if stored in the open air.
- **Keep dry at all times**
- The **unpacked** Collector must be carried by at least two people.
- Collector can be carried manually **or** by carry straps in either the **horizontal** or vertical position.
- Do not use tools that can **scratch** a Collector surface (e.g. steel cords, chains, metal hooks etc.).
- Always use lifting **equipment** (such a **ladder** hoists, pulley, swing hoists, or **truck-mounted cranes/conveyors**) to transport the Collector onto the roof.
- Never touch connectors while holding/carrying/lifting solar **Collectors**.

3. Pre-Installation

3.1 Collector Mounting Kit



Mounting Kit items:

Number of Collectors		1	2	3	4	5
Item	Name	Quantity				
1	Profile Rail	2	2	4	2+2	4
2	Roof fixing	4	6	8	10	12
3	Clamp	4	8	12	16	20
4	Collector Grasper	2	4	6	8	10
5	Profile connector	0	0	2	2	2
6	Locking screw (screw M8x20, nut M8, washer, serrated lock washer,)	8 set..	14 set..	20 set..	26 set..	32 set..
7	Self-tapping screw	0	0	4	4	4
8	Wood screw No. 6 x 40	4	6	8	10	12

Ensure the Mounting Kit is assembled correctly as above, any damaged items must be replaced by the original items only.

3.2. Technical documentation

The EHC Thermal Solar Kit contains various types of components and it is therefore important that the relevant installation instructions of these items are carefully read before installation/mounting:

- Solar Collector
- Pump group
- Solar controller
- Solar hot water cylinder

3.3. Tools & additional equipment

- Spirit level
- Safety harness for use with a safety rope
- Scaffolding, ladder or lift

3.4. Collector location

The Solar Collector surface must be in perpendicular position to the sun's rays to obtain the most efficient radiation absorption and there fore must be installed on the south side of inclined roofs

Recommended Collector position.

- Angle to sun
 - 40° – 45° (all year round)
 - 30° approx. (summer time)
 - 60° approx. (winter time)



- Maximum snow and wind load capacity – 2,0 kN/m₂.
- Do not install solar Collectors if the slope value is less then 15° and more then 75°
- There should be no shading from trees, chimneys and **neighbouring tall buildings.**
- For Collectors in a row the row-to-row solar panel shading has to be **considered.**

Note: The information and drafts in this instruction refer to the vertical Collector assembly **only**.

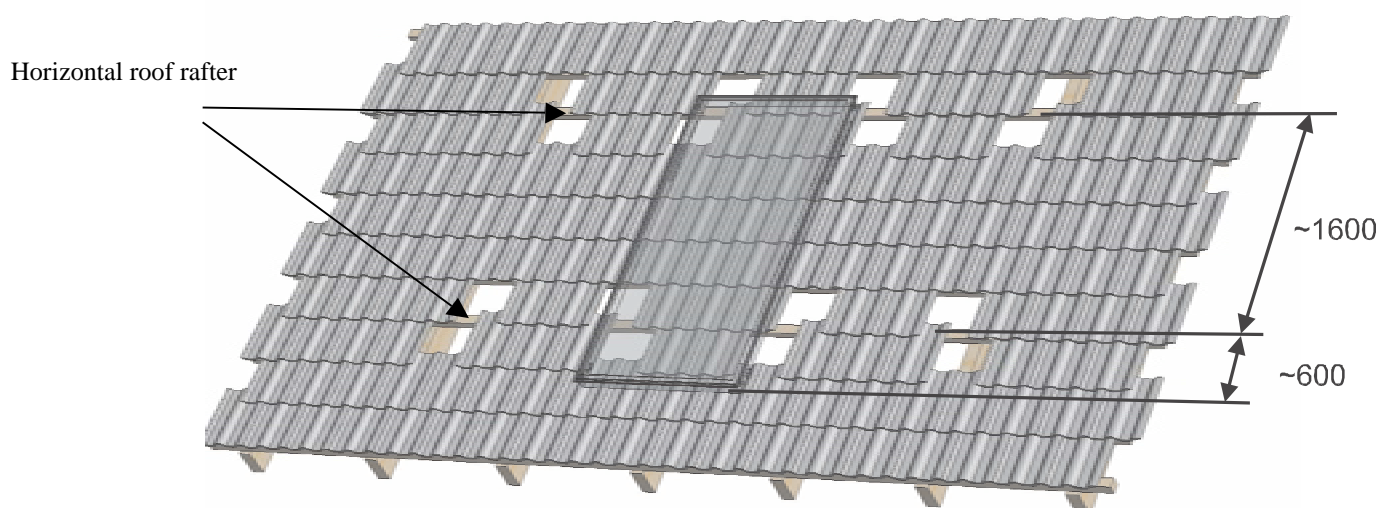
3.5. Key dimensions.

Quantity of Collectors (per set)	1	2	3	4	5
Dimension	Dimensions values [mm]				
A	1100	2200	3300	4450	5600
B	225		220		

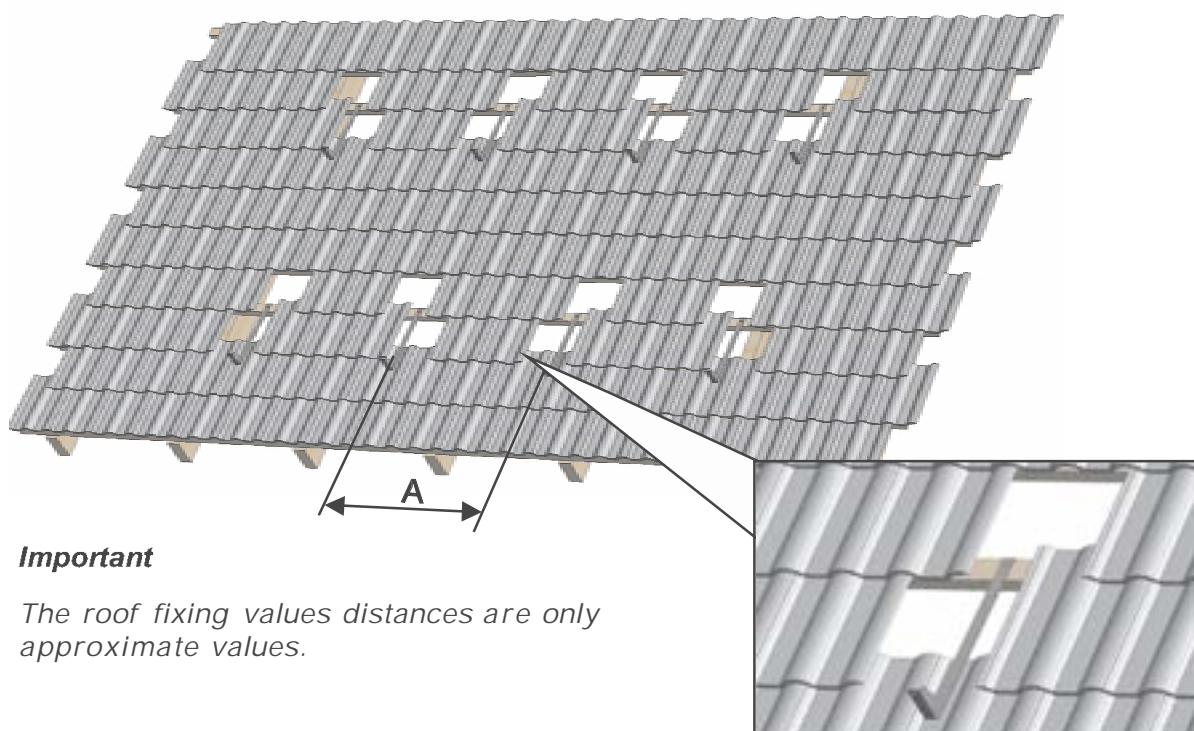
4. Collector Installation.

4.1. Roof fixing

Having **decided** on the location for the **Collector**, locate the internal horizontal roof rafters. Bear in mind that **lower** roof rafter must be located approx. 600 mm above bottom edge of the Collector mounting position, whereas the **upper** roof rafter must be located approx. 1600 mm \pm 200 above it. Remove some roofing tiles to get access to the roof rafters.

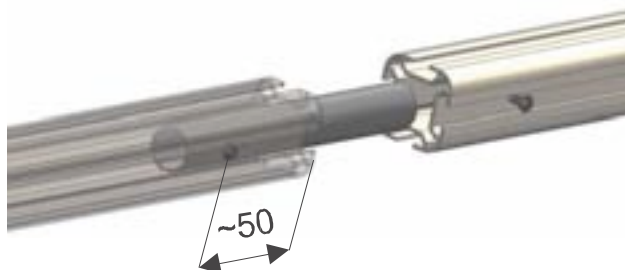


Fix to the roof by using No 6 x 40 wood screws and maintain the "A" value distance between roof fixing points.



4.2. Mounting Rails **connection**

For three or more Collector sets the mounting Profiles must be **connected**. Put the half-length of Profile Rail connector (5) into the one of the ends of the Profile Rail (1), and then secure it by fixing the self-tapping screw (7) – approx. 50 mm from Profile Rail edge (1).



Put the next Profile Rail (1) into the **second** end of the connector (5), and then secure it by fixing the self-tapping screw (7). Make sure **that** the Profile Rail edges (1) are placed parallel to each other. Repeat for all Profile Rail sets.

Important.

*If installing 4 **Collectors**, make sure that two fixed sets of Rails have the same length*

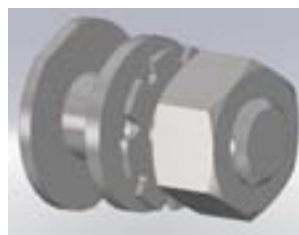
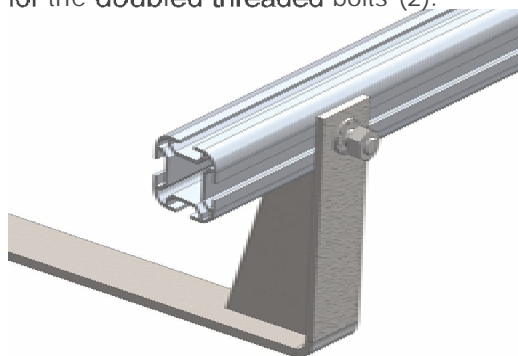
4.3. Mounting Rails assembly

Fix Profile Rail (1) into the double threaded bolts (2) using a locking screw (6).

Fix the locking screws (6) into the Profile Rail (1) with as many screws as doubled threaded bolts (2). Spacing between the locking screws (7) must be the same as for the doubled threaded bolts (2).



Fix the locking screws (6) into the double threaded bolts (2), and then lock the nut lightly.

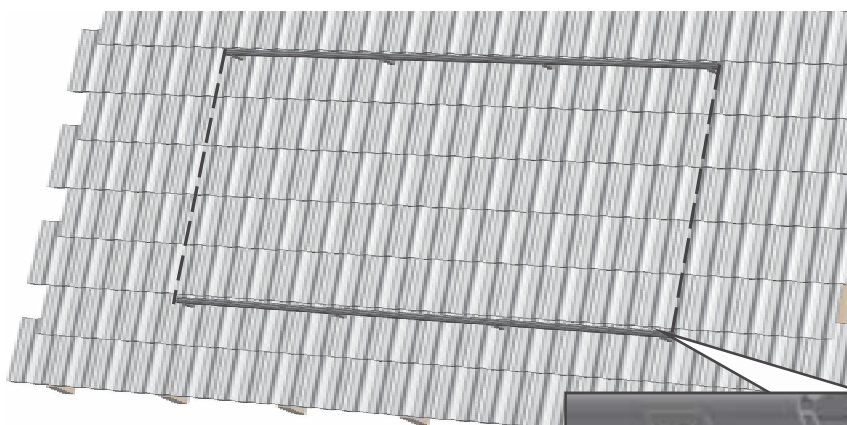


locking screw (6)

Important.

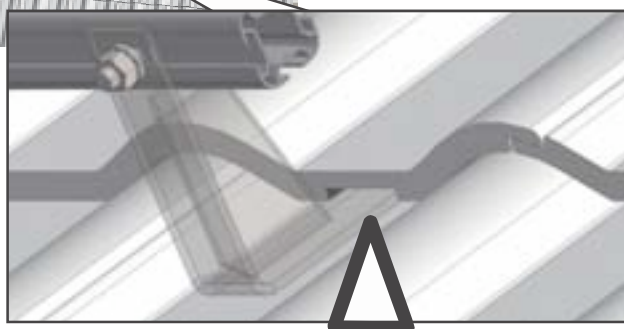
*Elements of locking screw kit: 1) screw M8 x 20, 2) washer, 3) serrated lock washer, 4) M8 nut
(Strictly follow above sequence when locking).*

Repeat for next row of roof fixing (2), then level the Profile Rail edges (top and bottom) and tighten **up** all locking screws (6).



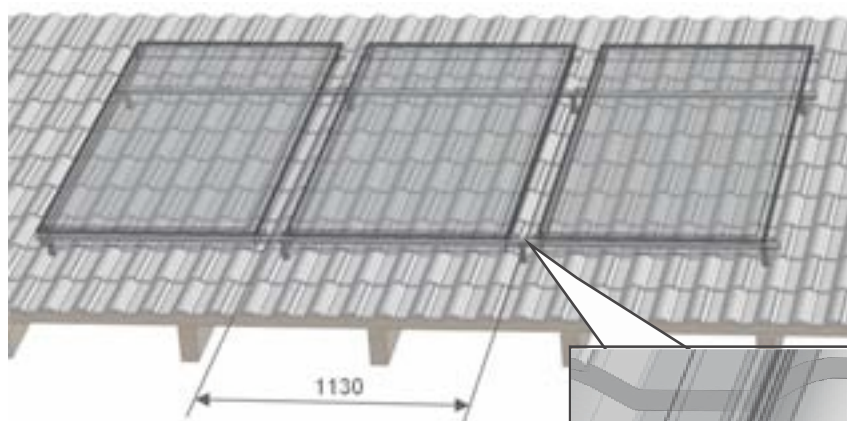
Important

*Depending on the type of tiles, some tile material may need to be removed in order to put the tiles **back into position***



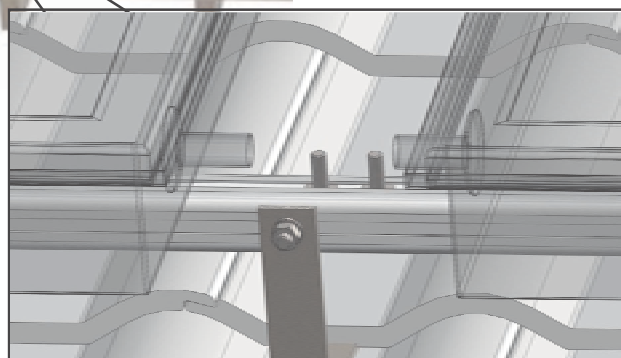
4.4. **Locking** screws for Collector Clamp

Put the locking screws (6) into the Profile Rail (top and bottom) to fix the Collector Clamp (3). Put the locking screws into the Profile Rail (1) as shown on the **picture**.



There are two Clamps (3) **between** Collectors so two locking screws (6) must be fixed and only one Clamp (3) on the edge **set**.

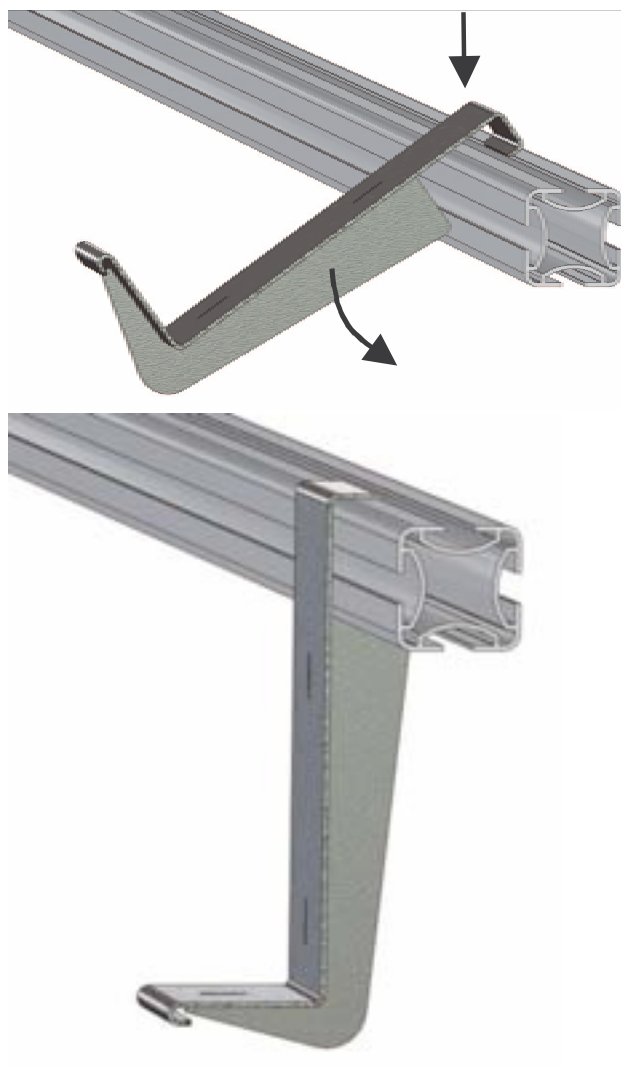
At this stage, you can put aside the **locking** screws (6) for Collector edges to fix them after you place the Collectors. The screws for **Clamp** (3) **between** Collectors have to be located symmetrically toward the Profile Rail centre.



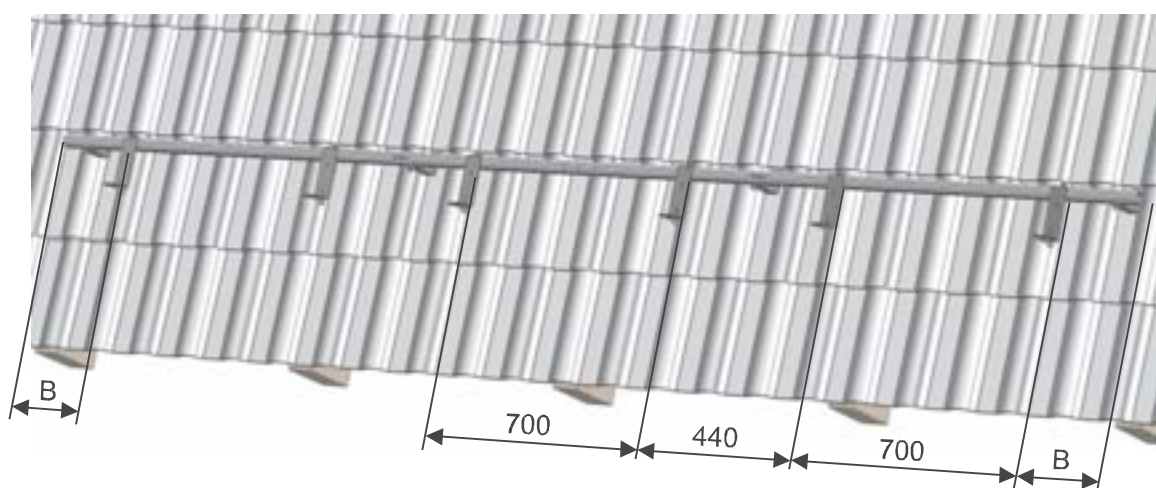
(Space requirements: approx. 1130 mm).

4.5. Assembly of Collector Graspers

Fix Collector Graspers (4) onto bottom Profile Rail (1). Hook the Collector Grasper onto bottom Profile Rail (1) and push downward to the final position.



Locate the first Grasper (4) at "B" distance away from Profile edge. For the other graspers keep the distance of 700mm and 440mm (alternate).



Important.

The distance between **Collector Graspers** is maintained correctly when the last Grasper is at "B" distance away from **opposite** edge of Profile Rail.

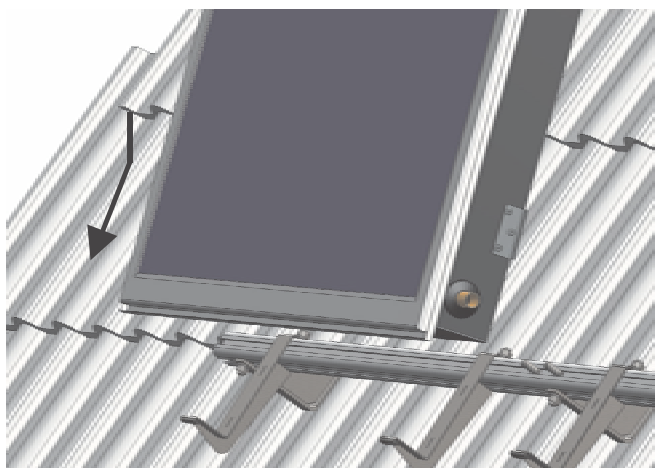
4.6. Assembly of **Collector**

Check all **connections** before first Collector **installation**.

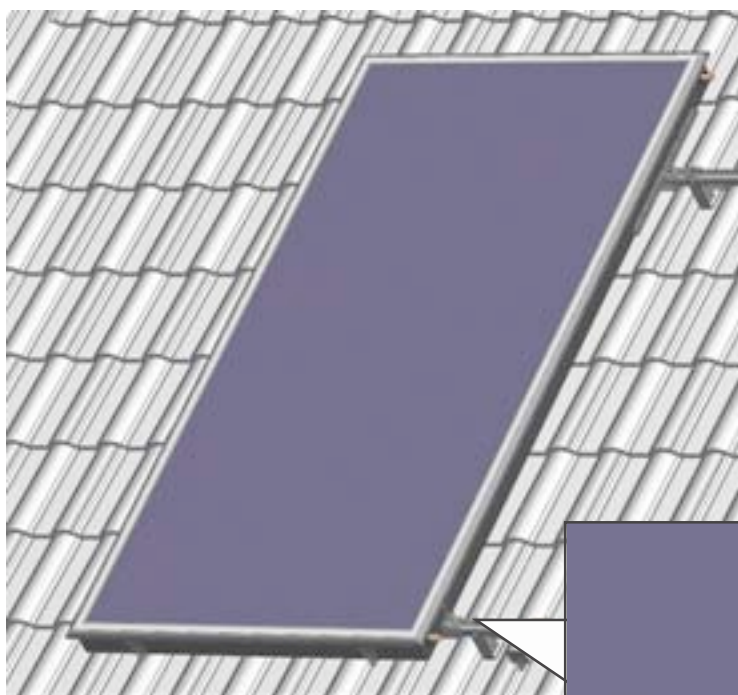
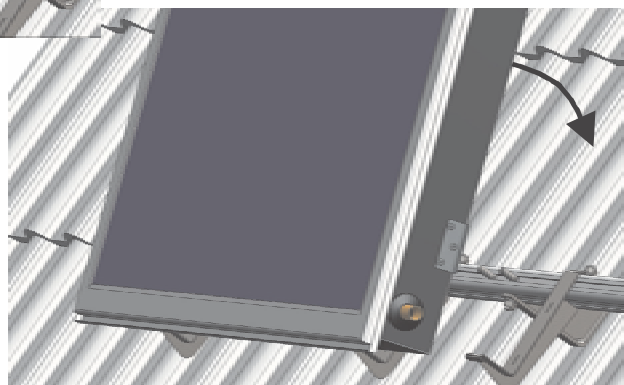


Important.

Protect **Collector** against potential damage (slide and fall accidents) that could occur when transporting solar **Collectors** on the **roof**.



Position the bottom edge of Collector against the Profile Rail (1). Slide the Collector **carefully** onto the two Graspers (4) **then** lean the Collector on the top Profile Rail (1).



Place the Collector symmetrically towards Graspers (4) then fix the four Clamps (3).

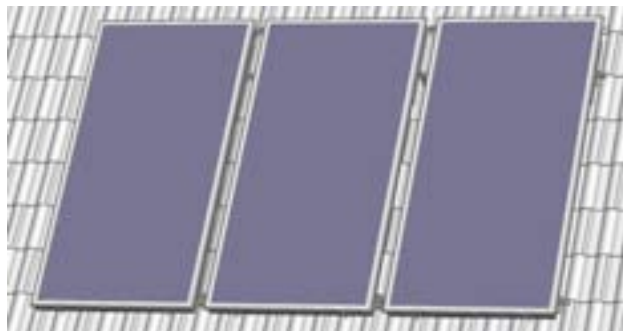
Fixing the Clamps: Put the **Clamp (3)** onto locking screw (the screw (6) that was placed into the Profile Rails (1) earlier - see **sub-clause 4.4**), **then** bring two elements as close as possible to Collector and put the **Clamp (3)** onto Collector angle bar. Next, put a washer, serrated lock washer into position and lock the nut lightly.



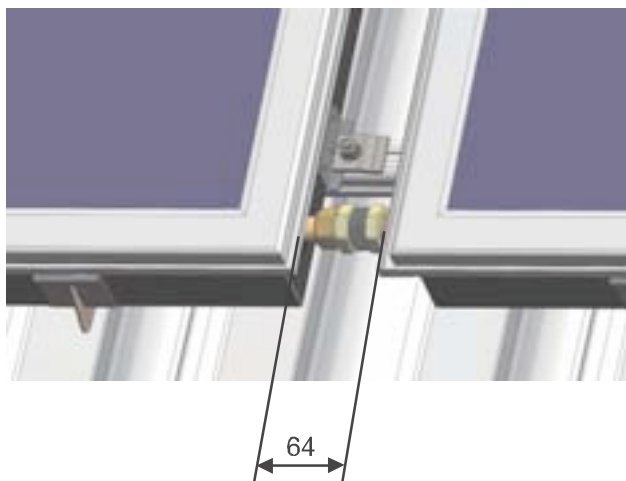
Adjust the final position of **Collector**.

4.7. Assembly of additional **Collectors**

Additional Collectors **included** in the set (excluding one piece Collector set) must be fixed on the Profile Rail (1), follow the **installation** work sequence **described** in sub-clause **4.6** and make a hydraulic **connection** of **Collectors** at the same time (according to sub-clause 4.8).



Keep the distance between the **Collectors** relatively constant (approx. 64 mm).



4.8. Hydraulic **connection**

- 1 - Collector connector
- 2 - Nut
- 3 - Clamping ring
- 4 - Expansion joint



Important

Maximum number of **Collectors** in one row is **5 pieces**.

The correct Collector **connection** sequence is:

- undo the nut (2) then put the nut onto **connector** (1),
- put the Clamping ring (3) onto **connector**,
- lock the nut (2) into **expansion joint** (4),
- put the nut onto **connector** of second Collector,
- put Clamping ring onto **connector** of second Collector,
- bring second Collector near to **expansion joint**,
- lock the nut onto **expansion joint**.

Important.

Tighten the lock nut tight enough to ensure a seal that is sufficient to guard against leaks. Do **not** tighten the nut with too much force to avoid damages of **connector** and expansion **joint**.

4.9. Inspection after assembly

After the hydraulic **connection has been completed**, double check that all **connections** are tight and secure. Make sure all Collectors are firmly fixed to the mounting **structures**.

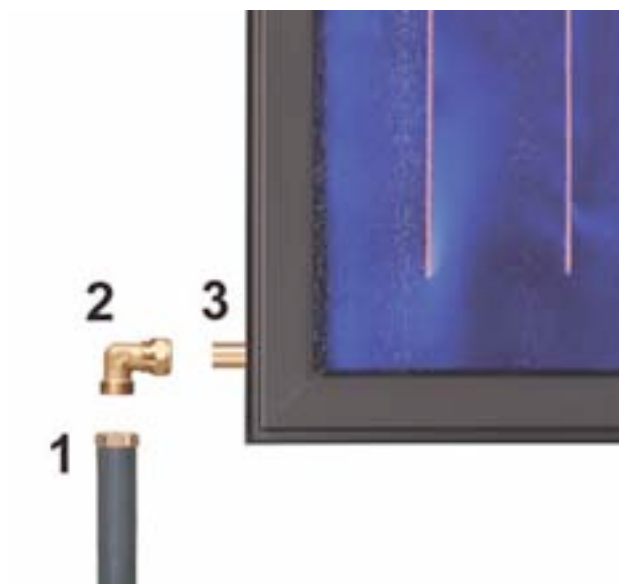
4.10. Inlet **connection**



Important.

Hydraulic **connection** elements can be fitted to either the right or the left side of **Collectors**.

- 1 -Flexible insulated hose 3/4"
- 2 - Clamping elbow
- 3 - Collector connector

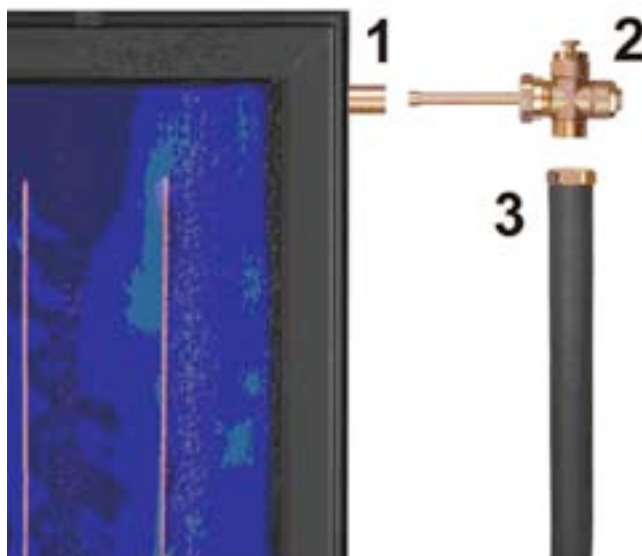


The correct inlet **connection sequence** is:

- put the elbow nut (2) onto Collector **connector** (3),
- put the Clamping ring onto Collector **connector**,
- lock the nut onto **elbow**,
- lock the flexible hose nut (1) onto **elbow**
- **connect** flexible hose to solar installation system

4.11. Outlet **connection**

- 1 - Collector connector
2 - cross pipe with manual air vent and immersion sleeve
3 - flexible insulated hose 3/4"



The correct outlet **connection sequence** is:

- use the Clamping piece to **connect** cross pipe (2) to Collector **connector** (1),
- lock flexible hose (3) onto cross pipe (2),
- **connect** flexible hose to solar installation system.

Standard Solar Mounting Kit includes manual air vent, however you can install an **automatic vent instead**. For the **automatic** air vent install ball valve (between cross pipe and air vent).



Important.

As solar systems reach high **temperatures**, installation of the vents and valves must be made of metal **only**.

4.12. Temperature sensor

Solar system malfunctions

Most solar system **malfunctions** are caused by faulty **temperature** sensor installation or damage to the signal **cable**.

To prevent damage to the signal cable by birds or rodents ensure the signal cable is encased by a corrugated pipe.

Install **temperature** sensor into immersion sleeve.

- insert **temperature** sensor all the way **down** into immersion heater,
- prevent Clamping spring from sliding out



4.13. Collecting pipes

Use flexible insulated hoses to make hydraulic connection to collecting pipes.
Connection of flexible hoses with solar installation must be made below vent valve level.

Do not connect inflexible collecting tubes directly to **Collector**.

Important.

Run the solar tubes through the roof by universal pass through for roofing or air shaft.

Important.

*Run the **temperature** sensor wire along with return flexible hose.*

Consideration must be given to the diameter of solar tubes. The proper diameter of tubes is determined by flow rate of heating medium: $0,4 \div 0,7 \text{ m/s}$.

The table below shows the diameter of tubes (**recommended**) according to quantity and type of solar **Collectors**.

ES Collector

Number of Collectors	Collector Arrays	Diameter of collecting tube [mm]
1	1	12 x 1
2		15 x 1
3		18 x 1
4		
5		
6	2	22 x 1
8		
10		

5. Final Commissioning

5.1 Check -Up

Once the installation has been completed the system must be flushed, hydraulic tested and system filled with Solar Fluid. In order to carry out these tasks a solar pump and expansion vessel need to be installed. Please refer to the manufactures installation & operating instructions for operation of these items.

The following steps require to be completed:

- make sure all elements of solar installation are fixed **correctly**,
- flush the pipe system,
- perform hydraulic pressure testing,
- fill the system with solar fluid.

5.2 Venting

Use **charging-de-aerating** station for filling and flushing solar **installations**. When the **automatic** air **vent** opens you must turn off the 'shut-off valve' once the venting has been completed. This 'shut-off' valve is located before the **vent**.

5.3 System protection

Once the above system testing has been carried out the Thermal Solar Collectors must be protected from the heat of the sun & potential damage from birds and rodents. A waterproof & heat resistant insulated cover must be fitted over the complete Thermal Solar installation (i.e. including all electrical sensors & control cables) .

6. Maintenance and Service



- **Maintenance personnel** should, before starting work, conduct risk assessments and take suitable precautions in order to prevent slips, trips and fall **accidents**.
- When moving the Collector to carry out maintenance work, ensure these are secured prevent falling.
- Use suitable tools and **equipment**.
- Use personal protective equipment (e.g. protective gloves, overalls **boots**, etc.)
- Check Collector **temperature** before executing any **maintenance** work; do not attempt maintenance while Collector is **hot**.
- Solar system **inspection** must be carried out **according** to warranty guide of any supplied **components**.
- Annual routine **maintenance checks** are recommended to assure trouble free solar system **operation**.

Frost Protection: **Determine** the frost resistance of solar fluid using the **refractometer**. Refill and vent the solar circuit, if the frost resistance of liquid drops below -20°C

System Pressure: Control the working pressure of solar circuit (drop pressure should not occur).

Expansion Vessel: control the initial pressure of **expansion** vessel. **Disconnect** the **expansion** vessel from the system and **determine** the rate of pressure. The initial pressure should be 0,3 bar lower than filling pressure (i.e. Normally 2,5 to 3 bar).

Cleaning the Collectors: When necessary clean the Collector using a general cleaning solution (i.e. mix the **washing** soda or soap liquid with water) then apply and rinse with **water**.

Control and safety system: Check the control and safety system as well as support structure of **Collectors**.

It is recommended that maintenance is carried out by a MCS Certified Installer to assure

7 Guarantee

The EHC Thermal Solar System is guaranteed against faulty materials or manufacture provided that:

- It has been correctly installed as per this document and all the relevant standards, regulations and codes of practice in force at the time.
- It has not been modified in any way, other than by the manufacturer.
- It has not been misused, tampered with or subjected to neglect.
- It has only been used for its intended purpose
- It has not been subjected to frost damage
- The unit has been serviced annually
- The guarantee period starts from the date of purchase and no registration is required.
- The extended guarantee is not transferable, and rests with the original householder.
- The system is fed from a public water supply.



The following Guarantee periods apply from date of purchase

Solar Collectors & Mountings	10 years
Electrical components & equipment	2 years

Please note that invoices for servicing may be requested to prove that the unit has been serviced annually by a competent MCS certified installer/service person.



EXCLUSIONS – THE GUARANTEE DOES NOT COVER the effects of scale build up, any labour charges associated with replacing the unit or its parts, nor any consequential losses caused by the failure or malfunction of the unit.

For advice, support, or further information on EHC's full range of heating products, call now on 01698 820 533.



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